OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **MILLEN POND** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *stable* in-lake chlorophyll-a trend. There was a slight increase in chlorophyll concentrations in September, but mean concentrations have remained below the NH mean for five years. We hope to see this trend continue for Millen Pond. While algae are present in all lakes, an excess amount of any type is not welcomed. Chlorophyll-a concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stable* trend in lake transparency. Transparency increased slightly this season, and all values were above the mean reference line for NH. The decrease in transparency in August was due to the somewhat heavy rainfall while sampling, and Secchi disk viewing would have been easier had the weather conditions been more favorable. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters.

Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *stabilizing* trend for the upper water layer, and a *slightly improving* trend for the lower water layer. Phosphorus concentrations remained uniform as the summer progressed in both the epilimnion and hypolimnion. A continuation of this trend is desirable for Millen Pond. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- **Please note** in June the epilimnetic phosphorus concentration was recorded as less than 5 ìg/L, and in July the epilimnetic and hypolimnetic phosphorus levels were found to be less than 5 µg/L. Also in September, at all station of the pond, the phosphorus concentrations were less than 5 ìg/L. The NHDES Laboratory Services adopted a new method of analyzing total phosphorus this year and the lowest value that can be recorded is 'less than 5 µg/L'. If this caused an increase in the average phosphorus for either of the layers we would like to remind the association that a reading of 5 µg/L is still considered low for New Hampshire's waters. We are very pleased to see concentrations so low and hope that this trend will continue for Millen Pond.

- *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. Bacteria concentrations were all very low at the sites tested (Table 12). If residents are concerned about septic system impacts, testing when the water table is high or after rains is best. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters.

- Dissolved oxygen was high throughout the water column (Table 9). As stratified lakes age, oxygen is depleted in the lower layer by the process of decomposition. The lack of this aging indicator is a sign of the lake's overall health.

NOTES

- Monitor's Note (7/4/00): Light rain previous evening. Outlet sample acid spill.

- Monitor's Note (8/7/00): Raining while sampling.

2000

- Biologist's Note (8/7/00): Weeds identified as native milfoil, pondweed, and pipewort.

- Monitor's Note (9/17/00): Draw down occurring to 2 ft. Cold and windy, around 48°.

USEFUL RESOURCES

Camp Road Maintenance Manual: A Guide for Landowners. Kennebec Soil and Water Conservation District, 1992. (207) 287-3901

What Can You Do To Prevent Soil Erosion?, WD-BB-30, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Wetlands: More Important Than You Think, NHDES Booklet, (603) 271-3503 or www.state.nh.us

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Phosphorus in Lakes, WD-BB-20, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Handle With Care: Your Guide to Preventing Water Pollution. Terrene Institute, 1991. (800) 726-5253, or www.terrene.org.

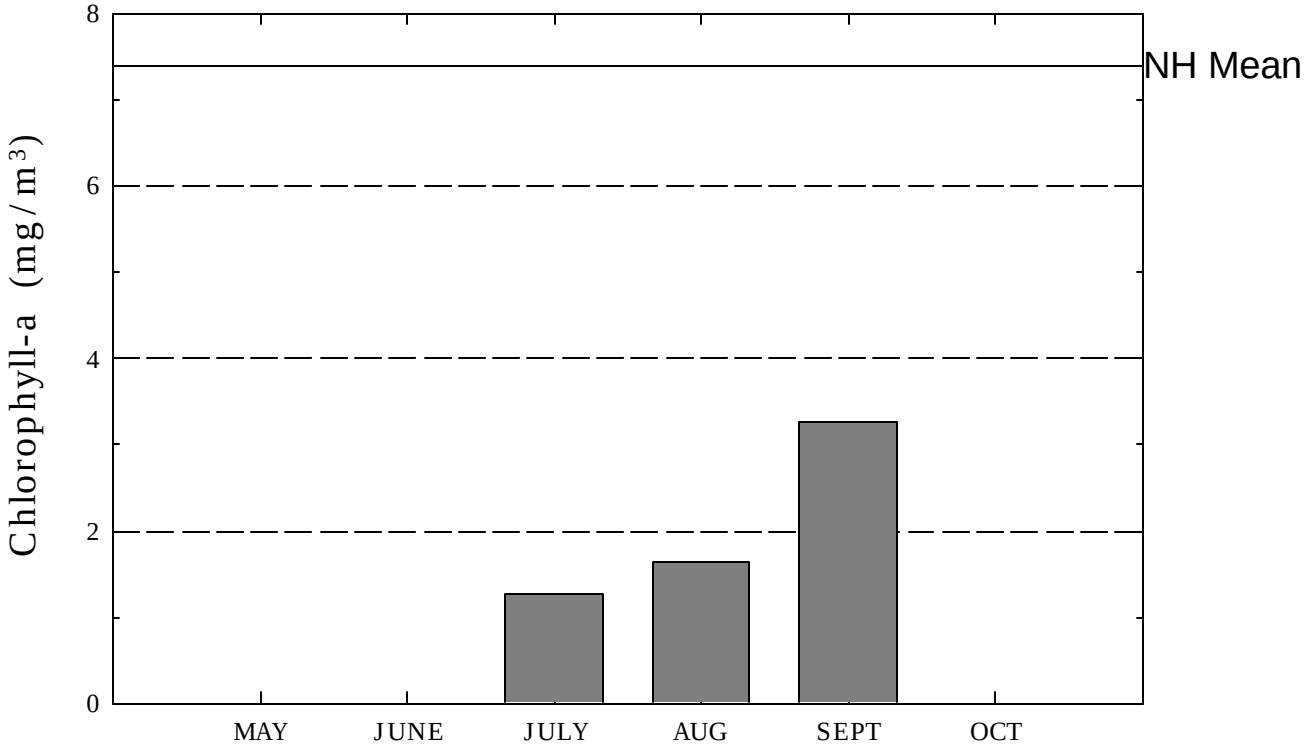
Road Salt and Water Quality, WD-WSQB-7, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Aquatic Plants and Their Role in Lake Ecology, WD-BB-44, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

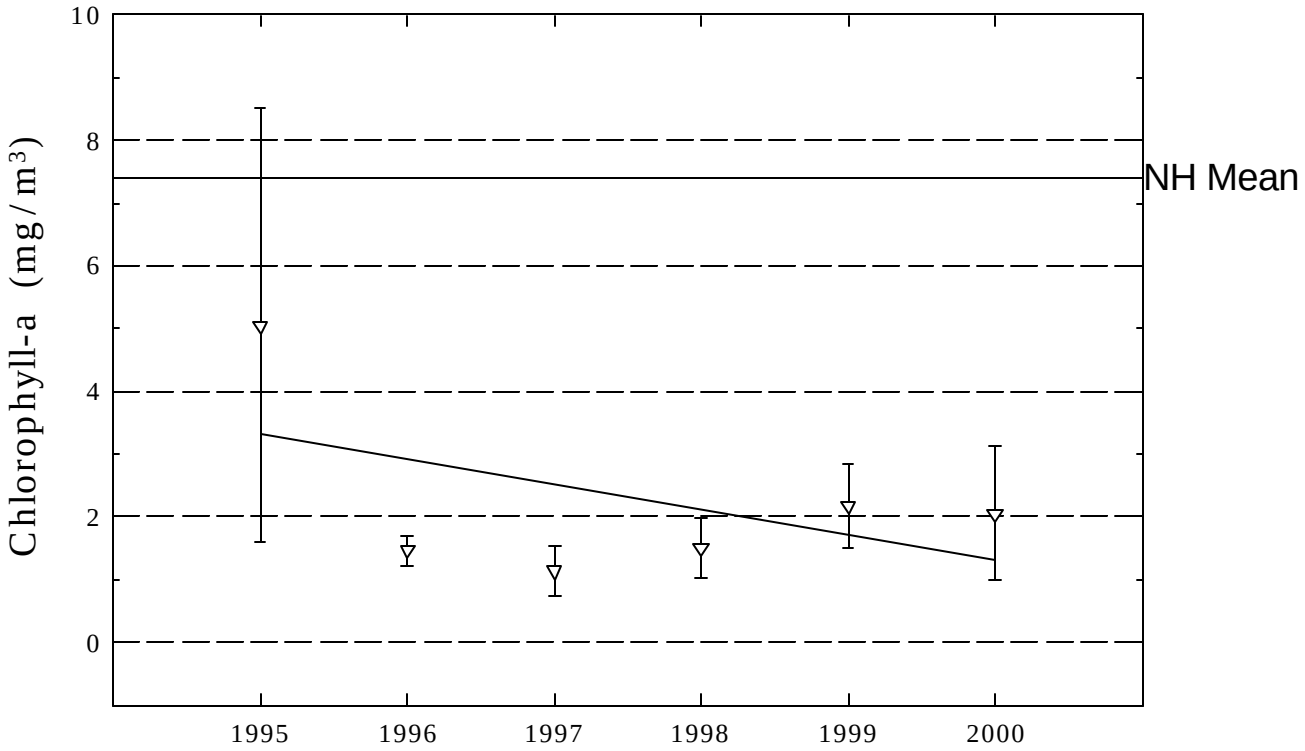
Through the Looking Glass: A Field Guide to Aquatic Plants. North American Lake Management Society, 1988. (608) 233-2836 or www.nalms.org

Millen Pond

Figure 1. Monthly and Historical Chlorophyll-a Results



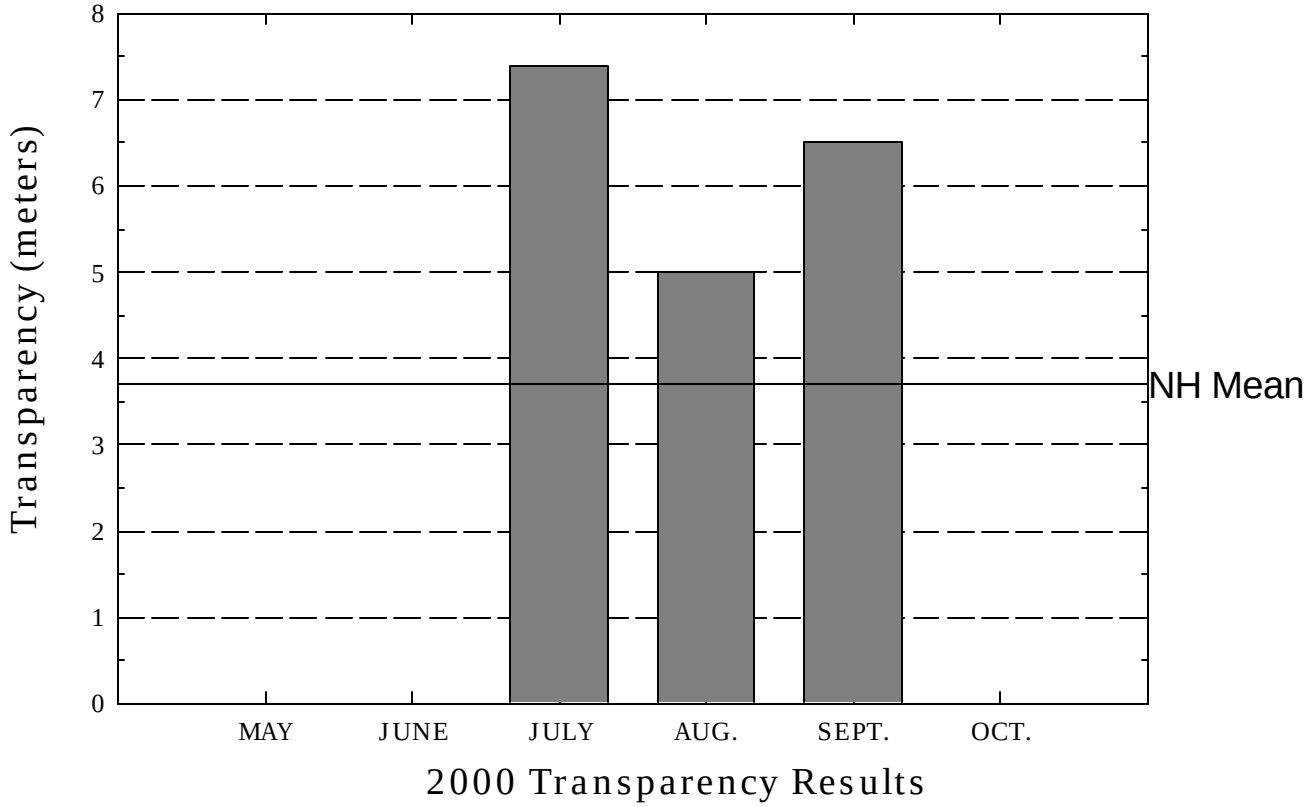
2000 Chlorophyll-a Results

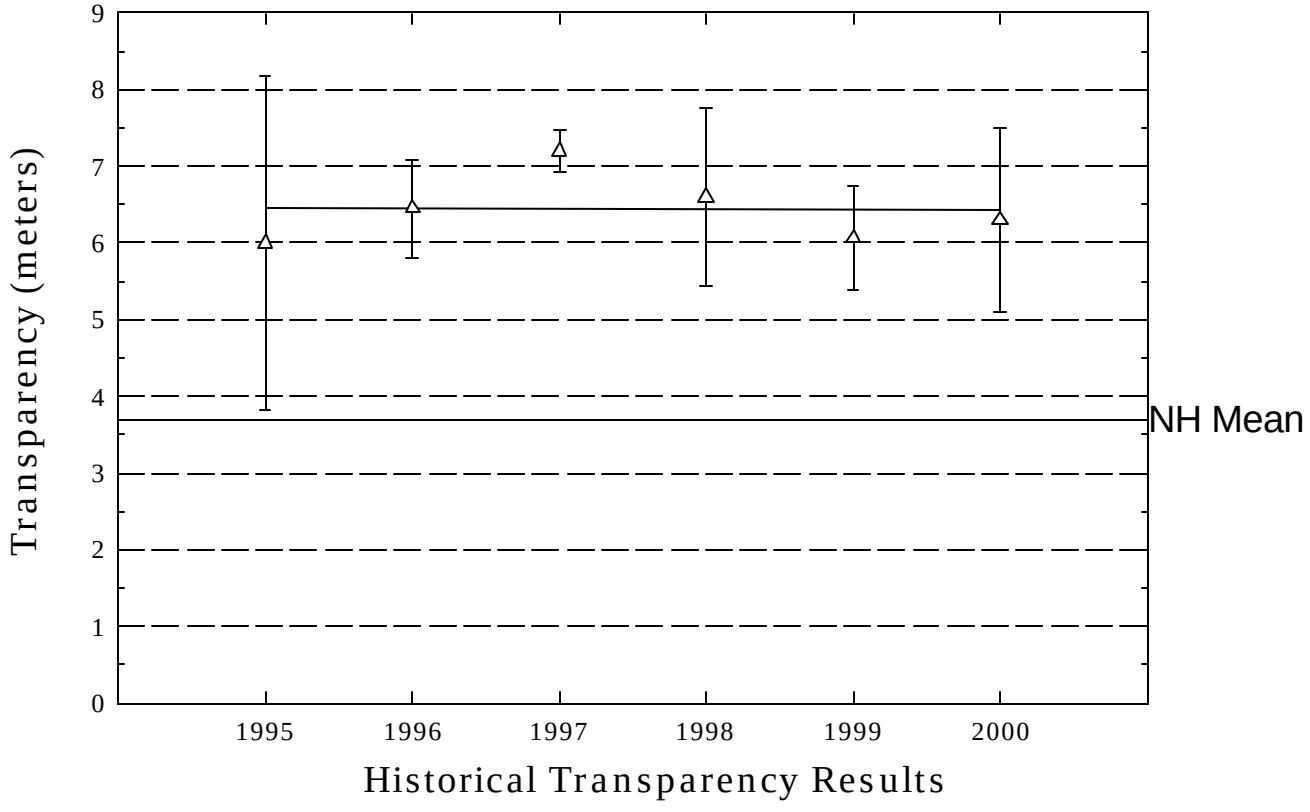


Historical Chlorophyll-a Results

Millen Pond

Figure 2. Monthly and Historical Transparency Results





Millen Pond

Figure 3. Monthly and Historical Total Phosphorus Data.

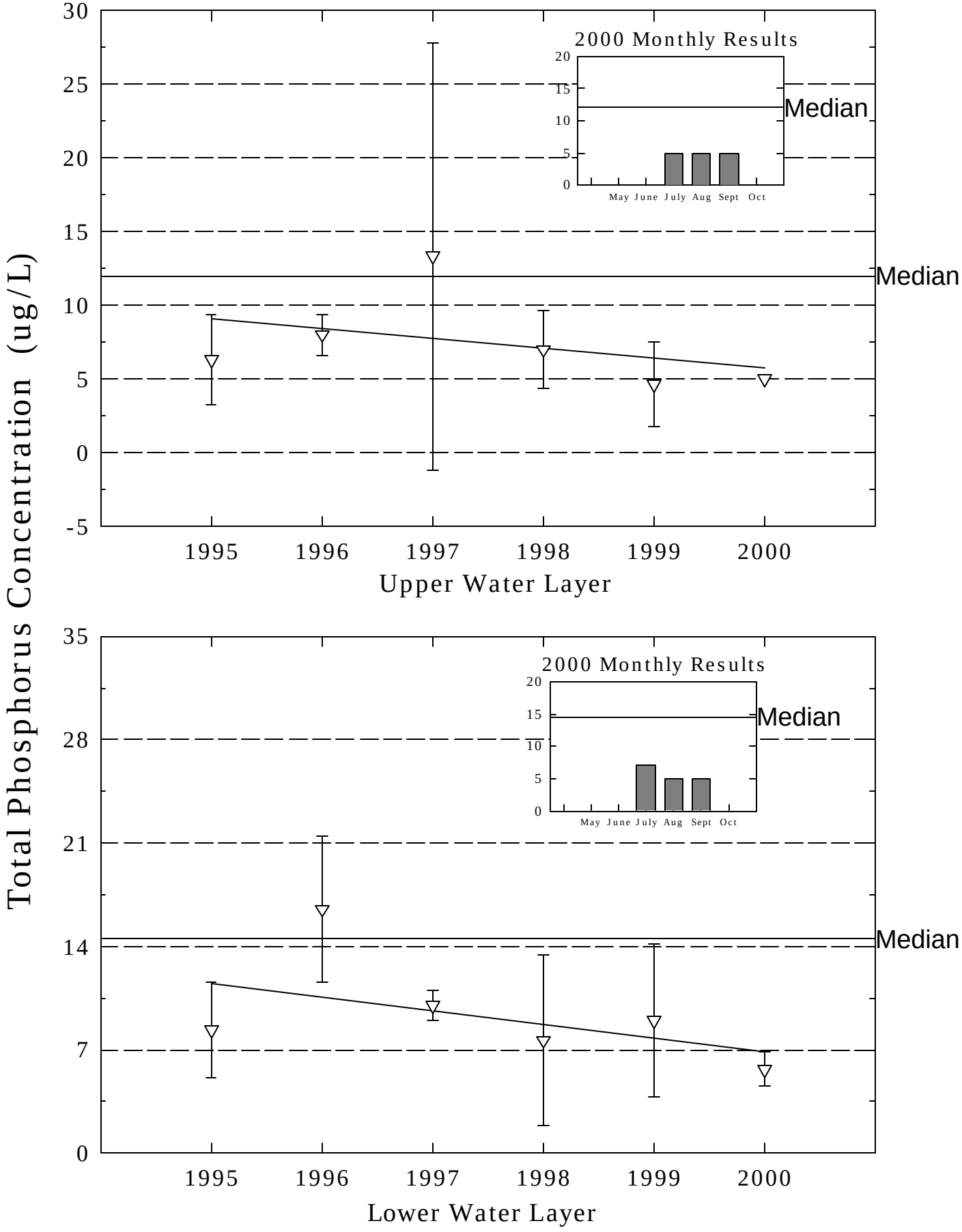


Table 1.

MILLEN POND

WASHINGTON

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1995	1.09	7.49	5.04
1996	1.30	1.64	1.47
1997	0.90	1.61	1.14
1998	1.07	2.01	1.50
1999	1.76	2.94	2.17
2000	1.26	3.27	2.05

Table 2.

MILLEN POND

WASHINGTON

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
07 / 14 / 1995	DINOBRYON	47
	PERIDINIUM	26
	TABELLARIA	8
07 / 29 / 1996	DINOBRYON	55
	UROGLENOPSIS	18
	MALLOMONAS	7
06 / 24 / 1997	DINOBRYON	90
	MALLOMONAS	5
	PERIDINIUM	5
08 / 05 / 1997	DINOBRYON	57
	RHIZOSOLENIA	16
	PERIDINIUM	8
08 / 04 / 1998	UROGLENOPSIS	68
	DINOBRYON	18
	TABELLARIA	5
08 / 03 / 1999	CHRYSOSPHAERELLA	79
	RHIZOSOLENIA	10
	MALLOMONAS	4
08 / 07 / 2000	RHIZOSOLENIA	49
	DINOBRYON	24
	TABELLARIA	7

Table 3.

MILLEN POND

WASHINGTON

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1995	4.5	8.5	6.0
1996	6.0	6.9	6.4
1997	7.0	7.5	7.2
1998	5.7	7.9	6.6
1999	5.3	6.6	6.0
2000	5.0	7.4	6.3

Table 4.

MILLEN POND

WASHINGTON

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1995	5.91	6.60	6.20
	1996	5.95	6.12	6.03
	1997	6.18	6.49	6.29
	1998	5.77	6.03	5.89
	1999	5.87	6.33	6.05
	2000	6.13	6.64	6.33
HYPOLIMNION				
	1995	5.78	6.29	5.93
	1996	5.61	5.68	5.64
	1997	6.01	6.17	6.09
	1998	5.45	5.75	5.54
	1999	5.69	5.97	5.83
	2000	5.83	6.04	5.95
INLET				
	1995	5.69	6.45	5.92
	1996	5.50	5.77	5.61
	1997	5.92	5.99	5.95
	1998	5.75	6.14	5.85
	1999	6.01	6.33	6.14
	2000	6.06	6.13	6.09
METALIMNION				
	1995	5.93	6.29	6.09
	1996	5.55	5.64	5.59

Table 4.

MILLEN POND

WASHINGTON

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
	1997	6.02	6.26	6.12
	1998	5.35	6.00	5.52
	1999	6.03	6.03	6.03
	2000	6.00	6.03	6.01
OUTLET				
	1995	5.53	6.07	5.81
	1996	5.73	5.76	5.74
	1997	5.88	5.92	5.90
	1998	5.55	5.75	5.61
	1999	4.99	5.96	5.36
	2000	5.64	6.04	5.86

Table 5.

MILLEN POND

WASHINGTON

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1995	1.00	1.50	1.30
1996	0.70	1.30	1.00
1997	1.10	1.50	1.37
1998	0.70	2.00	1.20
1999	1.10	1.50	1.27
2000	0.90	1.20	1.05

Table 6.

MILLEN POND
WASHINGTON

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1995	29.9	31.0	30.3
	1996	32.8	32.8	32.8
	1997	32.9	33.4	33.1
	1998	37.3	38.7	37.9
	1999	42.3	43.6	43.0
	2000	42.2	42.8	42.6
HYPOLIMNION				
	1995	29.2	31.8	30.7
	1996	32.4	33.3	32.8
	1997	31.5	33.1	32.2
	1998	39.4	39.6	39.4
	1999	42.9	43.2	43.1
	2000	42.4	43.0	42.6
INLET				
	1995	24.7	31.2	27.9
	1996	32.9	34.4	33.6
	1997	32.9	36.1	34.5
	1998	36.1	38.0	37.3
	1999	42.4	43.0	42.7
	2000	42.6	42.8	42.7
METALIMNION				
	1995	29.4	31.1	30.1
	1996	32.5	32.8	32.6
	1997	32.1	32.9	32.5

Table 6.

MILLEN POND
WASHINGTON

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
	1998	37.8	39.0	38.3
	1999	44.1	44.1	44.1
	2000	42.7	42.8	42.7
OUTLET				
	1995	32.2	36.1	33.5
	1996	37.4	40.3	38.8
	1997	36.0	36.1	36.0
	1998	40.9	49.4	44.2
	1999	45.1	57.6	49.7
	2000	44.1	59.3	49.7

Table 8.

MILLEN POND

WASHINGTON

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1995	3	9	6
	1996	7	9	8
	1997	4	30	13
	1998	4	9	7
	1999	3	8	4
	2000	< 5	5	5
HYPOLIMNION				
	1995	6	12	8
	1996	13	20	16
	1997	9	11	10
	1998	1	11	7
	1999	6	15	9
	2000	< 5	7	5
INLET				
	1995	5	5	5
	1996	7	13	10
	1997	17	19	18
	1998	1	6	4
	1999	3	8	5
	2000	< 5	6	5
METALIMNION				
	1995	7	9	7
	1996	8	9	8
	1997	4	7	5

Table 8.

MILLEN POND

WASHINGTON

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
	1998	1	10	5
	1999	8	8	8
	2000	< 5	6	5
OUTLET				
	1995	5	5	5
	1996	8	10	9
	1997	4	6	5
	1998	2	7	5
	1999	1	9	6
	2000	< 5	17	9

Table 9.

MILLEN POND

WASHINGTON

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		August 7, 2000	
0.1	20.8	8.5	94.6
1.0	20.8	8.5	94.6
2.0	20.8	8.4	94.3
3.0	20.7	8.5	94.3
4.0	20.7	8.4	93.6
5.0	20.7	8.4	93.6
6.0	20.6	8.3	92.4
7.0	20.5	8.2	91.4
8.0	20.0	8.2	89.9
9.0	19.1	7.8	84.0
10.0	15.6	9.7	97.6
11.0	13.4	6.3	60.0
12.0	12.8	3.1	29.5

Table 10.

MILLEN POND

WASHINGTON

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 14, 1995	11.0	14.2	5.2	50.0
July 29, 1996	11.5	12.1	7.2	67.0
June 24, 1997	12.0	11.9	9.0	80.0
August 5, 1997	11.0	15.2	9.2	91.0
August 4, 1998	11.5	12.5	0.1	1.0
August 3, 1999	12.0	14.4	0.3	3.0
August 7, 2000	12.0	12.8	3.1	29.5

Table 11.

MILLEN POND
WASHINGTON

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1997	0.2	0.2	0.2
	1998	0.2	0.6	0.4
	1999	0.2	0.3	0.3
	2000	0.2	0.3	0.2
HYPOLIMNION				
	1997	0.2	0.5	0.3
	1998	0.4	0.8	0.6
	1999	0.2	0.6	0.4
	2000	0.2	0.2	0.2
INLET				
	1997	1.1	1.5	1.3
	1998	0.3	0.5	0.4
	1999	0.3	0.6	0.5
	2000	0.2	0.4	0.3
METALIMNION				
	1997	0.1	0.3	0.2
	1998	0.4	0.8	0.5
	1999	0.4	0.4	0.4
	2000	0.2	0.4	0.3
OUTLET				
	1997	0.2	0.3	0.3
	1998	0.3	0.7	0.4
	1999	0.5	0.6	0.5
	2000	0.2	0.9	0.4

Table 12.

MILLEN POND

WASHINGTON

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
BOAT RAMP		
	July 4	1
LIBBEY'S COTTAGE		
	July 4	0
	September 17	1
	September 17	1
S. EAST SHORE		
	August 7	0

NOTE: "<" means "less than" and ">" means "greater than"